Motivation

Scrabble (noun): a commonly played word game in which players take turns forming words using a set of seven letter tiles and placing them onto a grid, following placement rules similar to a crossword puzzle.

Various tools exist to help players form their tiles into words in Scrabble, but there are very few options when it comes to finding a place to put them on the board. Entering the board into an application is a hassle.

The goal of this project is to create an image processing algorithm which reliably converts a complete image of a Scrabble board to a matrix of characters, which can be used as a frontend for applications like:

- Automated Scrabble “refereeing”
- Automated scoring
- Vocabulary building
- “Live” Scrabble AI players
- Cheating!

Experimental Results

Several methods for character recognition were considered for recognizing characters in individual tiles. These included:

- Geometric feature extraction [1] [2]
- Hu moment calculation [2] [3]
- Template matching using a reference set of tiles

By far the best recognition rate was achieved using template matching. However, the extraneous region removal step does not remove all. It also does not account for blended regions or characters incorrectly thresholded areas well (see the S misclassified as an M in the figure on the left, for example).

Future Work

- Add filter to remove regions which do not closely match any character
- Binary filter determining if a region is a character or not
- Or an improved version of the current template matching filter
- Improve grid filtering for tile size estimation
- Add perspective skew correction
- Add processing for tile rank

References